

Evaluating the Impact of Anti-Aging Integrative Therapy on Cellular Aging and Quality of Life

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Abstract: *This study evaluates the effect of anti-aging integrative therapy in 36 individuals with an age range of 40-85 years. The treatment included a combination of HBOT, ozone therapy, colon hydrotherapy, massage, saunas, rehabilitation, physiotherapy, and micronutrient therapy. Telomere length was used as a biomarker for objectively quantifying the outcome of the treatment. The effect of treatment was also assessed on various aging symptoms, such as decreased energy levels, memory issues, brain fog, mood swings, exertional dyspnea, sleep issues, joint pain, cramps, bloating, acidity, appetite, urinary incontinence, skin dryness, skin laxity and hair fall. At the end of the treatment, it was found that that 97.22% patients showed an increase in telomere length with an average increase of 0.43 ± 0.30 Kbp and 94.44% patients showed reduced biological age after treatment with an average decrease of 3.8 ± 3.08 years. These improvements were statistically significant. Improvements were also recorded in the majority of the symptoms. No major adverse events were observed. These results indicate that anti-aging integrative therapy has the potential to reverse aging symptoms, cellular aging and improve quality of life.*

Keywords: Telomere length, Anti-aging treatment, HBOT, Ozone therapy

1. Introduction

Telomeres are DNA-protein complexes located at both ends of each chromosome and are responsible for chromosomal stability, replication and separation of the genome during the cell division (1–3). They play a vital role in determining cellular fate and aging by regulating the cellular response to stress, adverse genetic and environmental factors (4,5). Telomere length progressively decreases with increased turnover of somatic cells and with increase in chronological age. Decrease in telomere length is also associated with various diseases, reduced physical performance and cortical thinning of the brain. Several genetic factors and environmental factors such as stress, lack of exercise, obesity, smoking, chronic inflammation, vitamins deficiency and oxidative stress may result in shortening of telomere length. Therefore, length of the telomere has been identified as one of the important biomarkers of aging. Decrease in telomere length effectively indicates cellular senescence and

aging. Accelerated attenuation of telomere is also commonly recorded in age-related diseases.

Aging is the accumulation of detrimental alterations in cells and tissues of organs that elevate the risks of diseases and death (6). Age-related conditions result in increased incidences of death and health-care calamities, such as degenerative disorders, benign and malignant carcinomas, cardiovascular diseases, musculoskeletal disorders, and arthritis (6,7). Aging causes gradual and irreversible degradation of physiological functions (7). It culminates in cell cycle lengthening and slowing of the epidermal turnover rate, which causes delay in wound healing and desquamation (8). The reasons for accelerated aging are speculated as follows: telomere dysfunction, deregulated nutrient sensing, epigenetic alterations, mitochondrial dysfunction, compromise in autophagy, cellular senescence, loss of proteostasis, stem cell exhaustion, and altered intercellular communication (7,9,10).

Reversing or slowing the rate of aging has tremendous health significance (8,9). Anti-aging therapies are found to influence the biological processes and delay the development of multiple ailments related to aging (11). They are affiliated with slowing, stopping, or reversing aging and its associated symptoms.

In this study, we have analyzed the effects of anti-aging integrative therapy conducted by KLS Wellness Institute & Neurogen Annexe Hospital which includes a combination of Hyperbaric oxygen therapy (HBOT), ozone therapy, colon hydrotherapy, infrared and ozone sauna, IV micronutrients, massages and rehabilitation. In addition to this, patients were also given a healthy and balanced diet. These therapies focus on increasing oxygenation of cells, reducing oxidative stress, detoxification, and most importantly, lengthening of telomeres. The effect of this treatment protocol was assessed using telomere length as a biomarker along with change in common aging symptoms.

2. Materials and Methods

Study design

This was an observational study conducted at KLS Wellness Institute & Neurogen Annexe Hospital, Navi Mumbai, India, between October 2021 to February 2024. The study included 36 patients who underwent anti-aging integrative therapy. Written informed consent was taken from all the patients. They underwent routine blood tests, and physical examination and investigations to verify the fitness for all the therapies. They were treated with anti-aging integrative therapy, which included HBOT, ozone therapy, colon hydrotherapy, massage, saunas, rehabilitation, physiotherapy, and micronutrient therapy. All the treatments received by the patients were non-invasive except for IV micronutrient therapy

Study Protocol

After patient's admission for anti-aging program, following was done

- 1) A detailed consultation and physical assessment by medical doctors and rehab experts.
- 2) Blood investigations - Routine blood test, Hormone panel and vitamin profile and Sr Cortisol.
- 3) Blood was also sent for Sr Telomeres test.
- 4) BMI, and cardio stress screening
- 5) Following Therapies were done in 7 days' time- Hyperbaric oxygen therapies- 10 sessions; Ozone therapy through rectal, ear and boto, 7 sessions; Hydro Colon therapy- 1 session; Enema - 2 sessions; IV Micronutrient - 1 session; Infrared sauna - 1 session, Ozone sauna- 1 session, Shirodhara- 1 session; Massages- 7 sessions; Rehabilitation - 6 sessions
- 6) After a week of treatment again blood is collected for routine tests and telomeres.
- 7) A Comprehensive discharge summary is given to the patient at discharge explaining about assessment, treatment given and advice about medication/ supplements, rehabilitation and diet to be followed as a part of home program.

Treatment Given

HBOT

HBOT (Hyperbaric Oxygen Therapy) was given for the duration of 60 minutes daily in a hyperbaric chamber manufactured by TEKNA, India. The chamber was flooded with 100% pure oxygen at pressure varying from 1.3 ATA to 1.8 ATA.

Ozone therapy

Ozone therapy was mainly administered by 3 ways: via rectum, via ear, or breathing ozone through oil (BOTO) using the ozonator machine manufactured by Ozone Forum of India. Ozone therapy uses pure 100% medical grade oxygen-ozone combination. Rectal ozone takes 10 minutes, ear ozone 5 minutes and boto for 10 minutes.

Colon hydrotherapy

In colon hydrotherapy, the colon of the patients was irrigated gently by RO and UV purified warm water through a tube inserted in rectum using a machine named angle of water manufactured by Lifestream Inc., USA. Two types of enemas were administered namely oil enema and herbal enema pre colon hydrotherapy.

Massage and Sauna

They were given different types of massages and various sets of therapies that include, shirodhara, janu basti, kati basti, manya basti, nasyam, dhoopan, etc. Massages were administered as deep and slow strokes. They were also given Infrared and ozone sauna. In Infrared Sauna, the patients were exposed to infrared light in a sauna chamber manufactured by BLIZZ detox care for 20 minutes, while in the case of ozone sauna, the patients were exposed to ozone and oxygen mixture in a controlled manner by a chamber manufactured by ozone forum of India for a period of 20 minutes.

Rehabilitation and Physiotherapy

Rehabilitation and physiotherapies were performed by trained therapists - Physiotherapist, occupational therapist, psychologist customized according to patients need. Apart from doing physical therapies the patients received physical modalities as a part of pain management program such as I TECAR, ultrasound, transcutaneous electrical nerve stimulation, interferential therapy, and class 4 laser manufactured by Biotech, India.

IV Micronutrient therapy

The patients were administered with multivitamins and minerals intravenously. The formulations used were IV Myer's cocktail (Vitamin C, Vitamin B complex, Magnesium Chloride), IV Glutathione, IV N-acetyl Cysteine, IM Vitamin D, etc. Additional oral micronutrients were given according to the patient's biochemical deficiencies like Vitamin D, Calcium, Magnesium, Iron, folic acid, B complex, at discharge

Diet

Nutritious and vegetarian diet was given during the stay. It involved anti-inflammatory food and was designed according to the biochemical changes in the blood. A diet chart was also given at discharge for management.

Inclusion and Exclusion Criteria

Inclusion criteria: Patients of any gender above 40 years of age.

Exclusion criteria: Lactating or pregnant females or females in menstrual period.

Specific contraindications for each therapy includes HBOT- patients suffering from any lung disease or respiratory distress, recent seizure history, recent ear surgery, tympanic membrane dysfunction, patients with pacemakers, epidural implants, any battery-operated implants or pain pumps, untreated glaucoma, increased intracranial pressure, fever, acute rhinitis and cough.

Ozone- Patients with G6PD deficiency, Hyperthyroidism, bleeding disorders like hemolytic anemia, allergy or hypersensitivity to ozone, presence of bleeding from any orifice, acute fissure, bleeding hemorrhoids, fistulas, increased frequency of stools for rectal ozone. History of seizures or abnormal EEG at any time in life, ear implants/ ear surgery or acute ear infections for ear insufflations with ozone.

IV Micronutrients - Patients with hemochromatosis, history of renal oxalate stones, renal impairment or renal failure. Patients with severe asthma for IV glutathione.

Sauna - Patients with open wounds, lesions or ulcers, fever, urinary tract infection, labile hypertension, COPD, inability to sweat, blood disorders, acute trauma, low blood sugar or cardiovascular problems.

Enema and hydrocolon - Acute fissure in anus, third degree rectal prolapse, bleeding hemorrhoids, acute fistula in anus, Hernia .

Data analysis

The effect of treatment was evaluated by studying the changes in telomere length and corresponding biological age. Percentage analysis was done for change in common symptoms of each individual before and after the treatment. The length of telomeres was used as a quantitative measure of anti-aging. Telomere length testing was done by DiponEd BioIntelligence, India using Mileage™ Test. The length of telomeres was tested from the DNA of Peripheral Blood Mononuclear Cells from blood samples using RT-PCR. In this study, we also documented and studied the most common issues experienced by the study group which include decreased energy levels, memory issues, brain fog, mood swings, exertional dyspnea, sleep issues, joint pain, cramps, bloating, acidity, appetite, urinary incontinence, skin dryness, skin laxity and hair fall.

Statistical Study

The data was tested statistically using paired T-test with a significant p-value < 0.05. The p-value was calculated for change in telomere length and change in biological age before and after treatment.

3. Results

In this study, 36 patients underwent the anti-aging integrative treatment, out of which 24 were females and 12 were males. The age range of the study group was 40-85 years. Some of the patients had comorbidities, such as diabetes mellitus, hypertension, hypothyroidism, rheumatoid arthritis, etc. (Table 1).

Table 1: Demography of patients

Demographic Data of the study group		
Total No. of patients		36
Gender	Male	12
	Female	24
Age Range	40-50	7
	50-60	12
	60-70	8
	70-80	5
	80 and above	4
Comorbidities	Diabetes Mellitus	10
	Hypertension	17
	Hypothyroidism	6
	Ischemic heart disease	3
	Eczema	1
	Recurrent cystitis	1
	Insomnia	1
	Benign prostatic hyperplasia	1
	Parkinson's disease	1
	Arthritis	1
Hypoplastic Thrombocytopenia	1	

Symptomatic changes

After the anti-aging integrative treatment protocol at discharge, no major adverse events were observed. Patients showed improvements in various symptoms such as energy levels, memory issues, mood swings, exertional dyspnea, sleep issues, joint pain, cramps in the limbs, bloating, acidity, loss of appetite, urinary incontinence, skin laxity, skin dryness, hair fall, etc. (Table 2) (Fig 1).

Table 2: Percentage analysis of Symptomatic improvements seen in patients after anti-aging integrative treatment

Symptoms	No. of patients Affected	No. of patients Improved	Percentage Improved (%)
Energy Levels	31	31	100
Memory Issues	21	15	71.43
Mood Swings	13	10	76.92
Exertional Dyspnea	18	16	88.89
Sleep Issues	15	12	80
Joint pain	25	22	88
Cramps	20	20	100
Bloating	22	20	90.91
Acidity	20	20	100
Appetite	11	10	90.91
Urinary Incontinence	13	9	69.23
Skin Dryness	25	25	100
Skin Laxity	24	11	45.83
Hair Fall	22	14	63.64

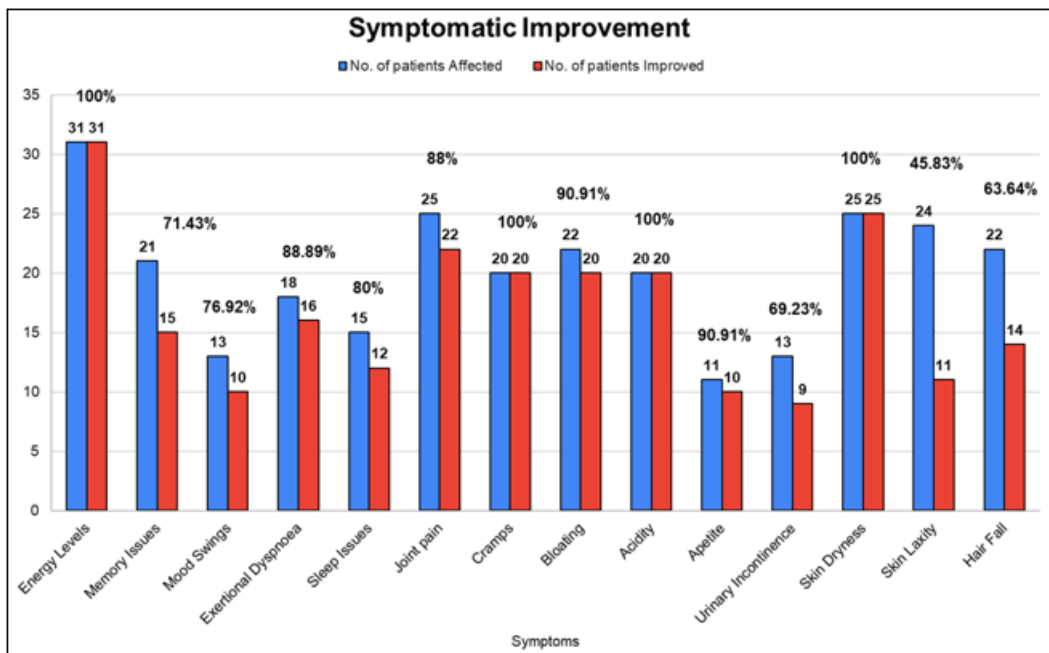


Figure 1: Graph representing improvement in symptoms after anti-aging integrative therapy

Telomere length

The telomere length of patients before and after integrative therapy were tested. (Fig 2). 35 out of 36 (97.22%) patients showed increased telomere length (Fig 3). The telomere length increased by an average of 0.43 ± 0.30 Kbp. The most increase of telomere length was noted to be 1.4 Kbp. In 1 patient, there was no change in telomere length. On statistical analysis, the difference in the telomere length before and after treatment was found to be statistically significant (p -value<0.05) (Table 3)

34 out of 36 (94.44%) patients showed reduced biological age after treatment (Fig 3). The biological age of these patients reduced by 3.8 ± 3.08 years on an average, with the most reduction in biological age being 17 years. In 2 patients, biological age was not reduced at all (Fig 4). On statistical analysis, the difference in the biological age before and after treatment was found to be statistically significant (p -value<0.05) (Table 3)

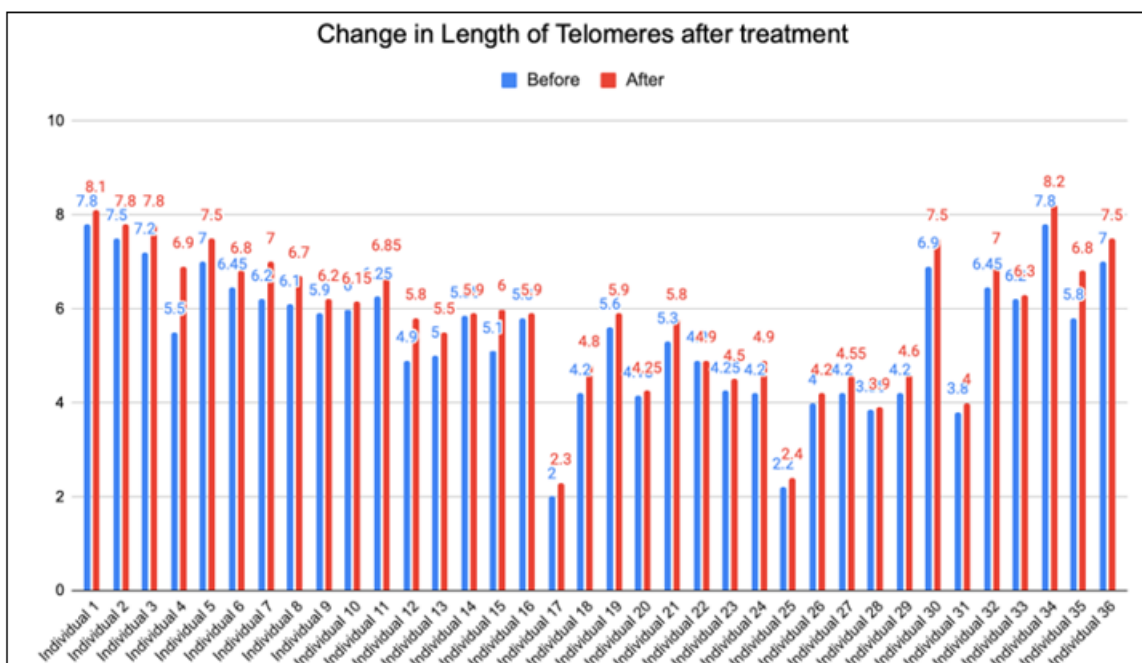


Figure 2: Graph representing change in telomere length after anti-aging integrative therapy in 35 out of 36 individuals enrolled in the study.

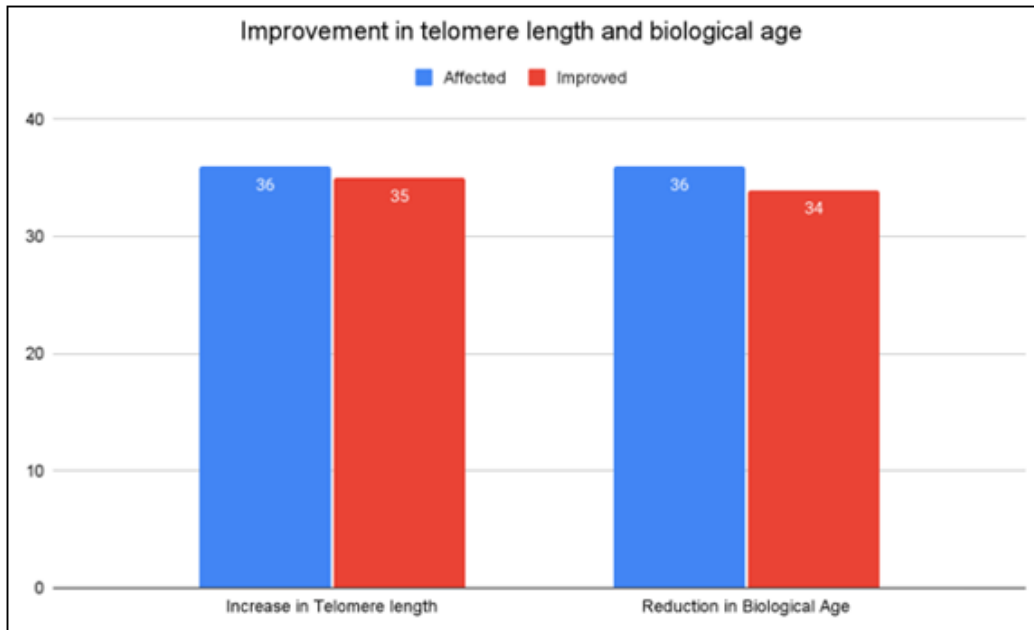


Figure 3: Graph representing improvement in telomere length and biological age

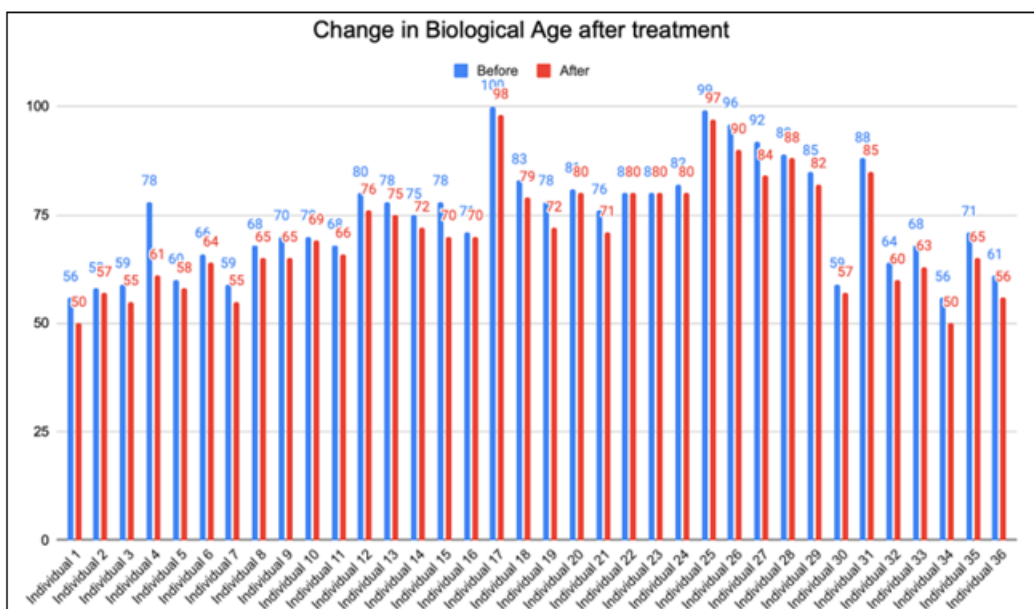


Figure 4: Graph representing reduced biological age in 34 out of 36 individuals enrolled in the study.

Table 3: Statistical analysis of Increase in telomere length and reduction in biological age of all patients after treatment

Measurement	Pre mean	Post mean	P-value	Significance
Increase in Telomere length	5.43	5.86	0.025	Significant
Reduction in Biological Age	74.5	70.69	0	Significant

4. Discussion

The anti-aging integrative therapy resulted in significant increase in telomere length and therefore reduced biological age in most patients enrolled in the study. 35 out of 36 (97.22%) patients showed increased telomere length and 34 out of 36 (94.44%) patients showed reduced biological age after treatment. The patients who underwent anti-aging therapy also reported improvements in all common aging symptoms.

Aging can be attributed to various mechanisms such as telomere dysfunction, deregulated nutrient sensing, epigenetic alterations, mitochondrial dysfunction,

compromise in autophagy, cellular senescence, loss of proteostasis, stem cell exhaustion, and altered intercellular communication (12). Telomere length, since long, has been recognized as a biomarker for aging and age-related disease risk. (13). Telomeres are the ends of chromosomes that shorten progressively after cell divisions (1). Human chromosome ends are typically capped with between 0.5 and 15 kilobase (kb) pairs of detectable telomere repeats depending on the type of tissue, age, and the replicative history of the cells. They are essential for maintaining genome stability. The telomere length in human granulocytes and lymphocytes from human peripheral blood is found to decline with age. (14) Various genetic, lifestyle and environmental factors have a cumulative effect on

decreasing the telomere length over time thereby resulting in cellular senescence and aging. (15,16) Oxidative stress, inflammation and DNA damage have also been associated with telomere shortening (17).

Research has shown that treatment strategies such as HBOT, ozone therapy, multivitamin administration, diet, exercise, etc. can help inhibit telomere attrition further delaying the aging process. These anti-aging treatments may also have a beneficial effect on reversing or halting aging by increasing the length of telomeres. (18) Many studies have found that HBOT increases the length of telomeres (19-20). A study conducted by Fu Qiaoyu et al. showed that HBOT promotes tissue healing and regeneration by increasing the oxygenation of tissues (21). It helps in angiogenesis enhancement, immunomodulatory properties, elevation of antioxidant activity, suppression of cellular senescence, and stem cell regulation. Hyperbaric oxygen dissociates carbon monoxide from cytochrome C oxidase, improving electron transport and cellular energy state. Another study by Hadanny Amir et al. hypothesized that HBOT activates multiple transcription factors and gene expressions and is responsible for manipulating the transcriptome (22).

Ozone therapy also affects the telomere length positively (23). It facilitates cellular respiration. Omar Seyam et al. found that ozone improves the body's response to antioxidants and helps in tissue repair and cellular redox balance (24). It increases the oxygenation of tissues at the cellular level, reducing hypoxia and enhancing cellular metabolism and cellular functioning. It improves blood circulation and restores damaged tissues and organs. (25) Moreover, it also possesses anticoagulant properties, which enhances blood flow to hypoxic bodily tissue. Rowen et al also found that ozone therapy improves anti-infective properties, immune modulation, oxygenation, and anti-inflammatory properties (26).

Colon hydrotherapy promotes immunity, increases energy and mental clarity, improves nutrition absorption, lessens digestive problems, and revitalizes the gut flora (27).

Massages reduce muscle stiffness, decreasing joint, neck and back pain, relaxation, and skin laxity (28). Deep slow strokes during massage therapy helps to improve lymphatic drainage.

Infrared light increases oxygen supplementation, and accelerates deep tissue healing and pain reduction (29). Infrared waves penetrate the skin to restore homeostasis and thermoregulation (29).

Micronutrients may influence telomere length by several mechanisms such as regulating oxidative stress and inflammation or modulating epigenetic reactions (30). IV multivitamin therapy helps in nutrient supplementation, which in turn influences telomere length and other cellular functions, such as inflammation, oxidative stress, DNA methylation, DNA integrity, and activity of telomerase, the enzyme that adds the telomeric repeats to the ends of the newly synthesized DNA (31). Glutathione neutralizes damaging free radicals and peroxide molecules, and recharges oxidized vitamin C. Glutathione is a very

important detoxifying agent, enabling the body to get rid of undesirable toxins and pollutants. Cellular Glutathione plays a vital role in protection against free radical damage associated with aging (32). Vitamin C acts as a powerful antioxidant agent and free radical scavenger that can protect the cell from oxidative stress, telomere attrition, disorganization of chromatin, and increase the lifespan (33). Physiotherapy and rehabilitation also reduce physical pain, muscle weakness, stooping, balance issues, bladder problems, dependence on previously independent activities. Moreover, LaRocca et al., found that individuals who exercised regularly had longer telomeres than individuals who did not exercise (34).

Therefore, improvement in aging symptoms and increase in telomere length of the study population can be attributed to the cumulative effects of all these anti-aging integrative therapies.

However, this study has a few limitations. The sample size was limited and there was absence of a control group. The potential long-term effects of the integrative therapy were not discussed here.

5. Conclusion

Anti-aging therapies help in managing and alleviating biological, behavioral, physiological, psychological, and other changes associated with aging. The therapies have a cumulative positive effect on aging which in this study was demonstrated by the increase in telomere lengths and decrease in biological age of the individuals. 97.22% patients showed an increase in telomere length with an average increase of 0.43 ± 0.30 Kbp and 94.44% patients showed reduced biological age after treatment with an average decrease of 3.8 ± 3.08 years. These improvements were found to be statistically significant. Improvements were also recorded in the majority of the aging symptoms. These results thereby indicate that anti-aging integrative therapy has the potential to reverse aging symptoms, cellular aging and improve quality of life.

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